REMARKS

Status of the Application

Claims 15, 19 and 20 are pending in the application. Claims 15 and 19 have been allowed. Claim 19 stands rejected under 35 U.S.C. § 103.

Claim Rejection - 35 U.S.C. § 103

Claim 19 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over US2003/0054198 (Tsuboyama), in view of WO 00/70655 (Baldo) and US 6,894,307 (Forrest).

Tsuboyama discloses a complex of the general formula $L_2L'M$ where L = unsubstituted 2-phenylpyridine or 4-methyl-2-phenylpyridine, L' = unsubstituted 8-quinoline and M = Ir. In Tsuboyama, Formulas (2) and (3) correspond generally to L_2M and Formulas (4) and (5) correspond generally to L'M as Applicants are using that symbology herein (please see Tsuboyama at page 4, paragraphs [35]-[38]). This text defines CyN4 as "a cyclic group containing 8-quinoline or its derivative" having a nitrogen atom connected to M. CyC1, CyC2 and CyC3 are, independently, a substituted or unsubstituted cyclic group containing a carbon atom connected to M. CyN1, CyN2 and CyN3 denote nitrogen-containing cyclic groups which may be substituted or unsubstituted, with a nitrogen atom connected to M. To explain Tsuboyama's formulas further, a $L_2L'M$ complex would have two species of Fomulas (2)-(5) and one heterospecies drawn from the same group. Tsuboyama also discloses $Ir(ppy)_3$ (page 2, Col. 1, paragraph [18] for example). The specific examples of $L_2L'M$ complexes cited by the Examiner, and the list is exhaustive as it pertains to claim 19, inclues Formula 42 ($L_2L'M$) and Formulas 11 and 13 (both show the partial L'M structure, provided that n = 1). In these depictions, the 2-phenylpyridine is unsubstituted; the 8-quinoline is either unsubstituted or is 4-methyl substituted.

Baldo discloses $Ir(ppy)_3$ (page 14, lines 15-18, first formula on the left, at page 6, lines 2-4, page 11, lines 7-9, and in the claims). Baldo teaches very generally that $Ir(ppy)_3$ can be alkyl- or aryl-substituted (page 14, line 20 to page 15, line 1) and that their substitution placement should be guided by steric considerations. Forrest (a co-inventor with Baldo in the two secondary references) also discloses $Ir(ppy)_3$ (e.g., Col. 10, lines 1-11, and elsewhere) and identifies it as a sensitizer molecule or intersystem crossing agent. Forrest teaches specifically that 2-phenylpyridine is an intersystem crossing agent that, in Forrest's first embodiment, conserves triplets formed in the host material and transfers them to the singlet exciton of the fluorescent dopant according to equation 1,

$$^3D^* + {}^1A \rightarrow {}^1D + {}^1A^*$$

wherein D and A represent, respectively, the donor (intersystem crossing agent) and acceptor (fluorescent dopant), the superscripts 3 and 1 represent, respectively, triplet and singlet states, and the asterisk indicates the excited state. (Col. 3, lines 22-38; Col. 9, line 49 to Col. 10, line 29). As with Baldo, the only substitutions taught by Forrest are alkyl or aryl groups on either the pyridine or phenyl ring, or both (Col. 17, line 44 to Col. 18, line 27) and further, the groups' placement is to be guided by steric (and not, for example, electronic) considerations. The utility taught for *fac*-$Ir(ppy)_3$ is as a sensitizer agent, namely a molecule that confers phosphorescent-type efficiency on a fluorescent emitter.

Combining Tsuboyama, Baldo and Forrest, then, we have: (i) a $L_2L'M$ emissive complex with structure and substitutions given, (ii) $Ir(ppy)_3$ which can be alkyl- or aryl-substituted according to steric considerations as an emitter, and (iii) $Ir(ppy)_3$ and some other examples of L_3Ir that are not pertinent here that can be sensitizer molecules to confer phosphorescent-type efficiency on a fluorine emitter and the very general teaching (with respect to the species disclosed, which are all L_3M complexes) that "the materials that produce the electroluminescent emission *may* be the same materials that function" as hole or electron transport materials (Col. 7, lines 31-34) [emphasis supplied]. Forrest, however, never identifies a particular single heterostructure layer or how one might predict whether a given electroluminescent material might also function as a P-type or an N-type semiconductor. Again, all of Forrest's sensitizer species are L_3M complexes except for a L_2Os specie that is not germane to this discussion.

Claim 19, by contrast, is directed to a $L_2L'M$ complex that functions as a N-type semiconductor that comprises the electron transport material in the ETL layer of an electronic device also having a [distinct] light-emitting layer. To the extent that Baldo teaches substitution, that teaching is limited to (a) substitutions on either one or both of the phenyl or pyridine rings of a 2-phenylpyridine ligand, (b) such subsitutions in an $Ir(ppy)_3$ complex, (c) the substituents are limited to alkyl and aryl, and (d) the choice and placement of the substituents, if any, is guided by steric considerations. Baldo does not teach alkyl-substitution on a quinoline system, and that is the issue relating to claim 19. Applicants respectfully deny that there is any motivation to combine Baldo with Tsuboyama, but assuming *arguendo* the two may be combined, Baldo does not teach that the 4-methyl substituent in one of Tsuboyama's exemplary structures can or should be moved to the 2-position or that such change to Tsuboyama's L' ligand would produce, or contribute to producing, an N-type semiconductor of the general formula $L_2L'M$. To the extent that any teaching can be gleaned

from Forrest, it would only apply to L_3M species, since that is all that Forrest discloses or teaches. There is no suggestion in Forrest that a configuration of a substituted $L_2L'M$ complex, such as the two species set forth in claim 19, could function as electron transport materials.

In summary, Applicants respectfully submit that combining of the teaching of Baldo and Forrest with Tsyboyama does not result in a device having separate light-emitting and electron transport layers and having iridium complexes in the electron transport layer, as recited in Applicants' Claim 19.

Applicants respectfully request that this rejection be withdrawn in light of the remarks presented above.

Conclusion

Applicants respectfully submit that claim 19, as previously presented, is in condition for allowance. A Notice of Allowance for claim 19 is earnestly solicited.

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